MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2017/2018

PSP 0101 – PROBLEM SOLVING AND PROGRAM DESIGN

(Foundation in Information Technology)

14 MARCH 2018
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **THREE** pages excluding the cover page.
2. Answer **ALL** questions.
3. Write your answers in the Answer Booklet.

Instructions: Answer **ALL** questions. Write your answers in the Answer Booklet.

QUESTION 1 [25 Marks]

a. Problems do not always have straightforward solutions. Some problems can be solved using algorithmic solution and some with heuristic solution.

i. What is an algorithmic solution? Give 2 example of problems that can be solved using algorithmic solution.

(3 marks)

ii. What is a heuristic solution? Give 2 example of problems that can be solved using heuristic solution.

(3 marks)

b. Assume that you have created a mechanical arm that can hold a pen. The arm can perform the following tasks:

- Lower the pen to a piece of paper.
- Raise the pen from the paper.
- Move the pen 1 cm along a straight line. If the pen is already in a lowered position, this action will draw a 1 cm line from left to right; if the pen is raised, this action just repositions the pen 1 cm to the right.
- Turn 90 degrees clockwise.

Assuming that the mechanical arm is always reset to be raised, list a set of instructions to draw a 2-cm width by 1-cm height rectangle. Refer to Diagram 1.

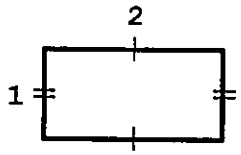

Diagram 1

(10 marks)

c. Complete the pseudocode so that it can print "Hello" 3 times.

```
Start
firstnum = 1
secondnum = ___
While firstnum ___ secondnum
     If firstnum ___ 2 == 0
          Print "Hello"
     End If
While End
End
```

(3 marks)

d. Evaluate the following equations:

i. T = 3 * 3 + 3 \ 2 – 1 + 5 * 7 % 4

ii. L = 5 + 3 == 8 OR NOT True AND False

(6 marks)

Continued...

QUESTION 2 [25 Marks]

a. You are asked to write a program that allows the user to enter values of a salesperson's base salary, total sales and commission rate. The program will calculate and display the salesperson's total salary by adding the base salary to the product of the total sales and commission rate.

i. Create the data dictionary by providing suitable variable names for the items and their data types.

(5 marks)

ii. Using the variables created in the data dictionary from Question 2 (a) (i), create an IPO chart for this problem.

(4 marks)

b. Lucas has a store that sells personalized lightsaber. He wants to create a program that can calculate the price of any lightsaber ordered by a customer based on the following factors:

- The choices of hilt (the handle or the grip of the lightsaber):
  - Arclyte Silver costs RM300
  - Skylar Black costs RM420
  - Aeryn Silver costs RM 550
- The choices of blade:
  - 32-inch blade costs RM45
  - 40-inch blade costs RM50
- Postage:
  - Within Malaysia – RM25
  - International – RM60

Write a pseudocode for a program that will calculate and display the total price that the customer has to pay after the data for the type of hilt, blade and postage are entered. You can use any type of decision structure in your solution.

(16 marks)

QUESTION 3 [25 Marks]

a. The Rebel Alliance Bank provides saving account that compound interest of 4% annually. In other words, if you deposit RM100 for two years at 4 percent interest, at the end of one year you will have RM104. At the end of two years, you will have RM108.16. Draw a flowchart using a Repeat-Until structure for a program that can accept the amount of money to be deposited and then calculate and display the number of years needed for the saving to be at least double the amount deposited.

(11 marks)

b. Write a pseudocode using a While-WhileEnd loop and a straight-through logic decision structure for a program to calculate and print a student's GPA for one specific trimester. The student should be able to enter the total number of subjects taken, the credit hour and the grade for each subject. Grade A is 4 grade point, B is 3 grade point, C is 2 grade point, D is 1 grade point, and F is zero grade point. Refer to Table 1 to see how the GPA is calculated. Note: Do not use array to solve this problem.

Continued...

Subject	Credit Hour	Grade	Grade Points
Subject 1	3	D	3
Subject 2	4	A	16
Subject 3	3	F	0
Subject 4	2	C	4
Subject 5	3	B	9
Total Credit Hour	15	Total Grade Points	32
		Grade Point Average (GPA)	2.13

Table 1: Example of Student's Result

(14 marks)

QUESTION 4 [25 Marks]

Mr. Han is the manager at Mos Eisley Restaurant. He wants to know how many employees are needed at the restaurant at each hour of the day. If the number of customer is less or equal to 20, 3 employees are needed to serve them. But if there are more than 20 customers at any hour, the customer to employee ratio cannot exceed 5:1. For example:
11:00AM → 20 customers → 3 employees
12:00PM → 25 customers → 5 employees
1:00PM → 34 customers → 7 employees
2:00PM → 21 customers → 5 employees
3:00PM → 17 customers → 3 employees
7:00PM → 30 customers → 6 employees
The restaurant is open 10 hours a day from 11:00AM to 9:00PM

a. Three arrays are needed to store the data for the hours of the day, the number of customers, and the number of employees needed for every hour of the day. The array for hours of the day has been created for you. Draw the other 2 arrays.

	0	1	2	3	4	5	6	7	8	9
HourOfDay	11	12	1	2	3	4	5	6	7	8

(4 marks)

b. Write the pseudocode for a function definition that calculates the average number of customer in a day. (Use automatic counter loop structure)

(5 marks)

c. Write the pseudocode for a function definition that determines the peak hour of the day. Note: Peak hour is the hour with the highest number of customer. (Use While-WhileEnd loop structure)

(7 marks)

d. Write the pseudocode for a function definition that determines the number of employees per hour needed in a day. (Use Repeat-Until loop structure)
Take note that there is no such thing as a partial employee.

(9 marks)

End of Paper